

Ice discharge of eastern Dome C drainage area, Antarctica, determined from airborne radar survey and satellite image analysis

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Abstract:

Eastern Dome C, southern Talos Dome and northern Taylor Dome are drained by the Priestley, Reeves, David, Mawson and Mackay outlet glaciers, which flow into the Scott Coast on the west side of the Ross Sea, Antarctica. Airborne radar surveys were conducted on these glaciers to determine ice thickness and bed morphology along transverse and longitudinal profiles of the grounded and floating segments. A new analysis of a Landsat Thematic Mapper satellite image using a tracking technique was used to measure ice velocity at grounding lines and along ice tongues. The integration of radar and satellite data helped to locate grounding lines and to calculate the ice discharge. Changes in ice fluxes of floating glaciers were used to determine basal melting and freezing rates. The ice discharge calculated is less than half that required for a zero net surface mass balance according to the inputs given by the accumulation estimates widely adopted at present. The basal melting rates of meteoric ice represent 50% of the net ablation rate.

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